

GCSE MATHS

Straight-line graphs

Worked Solutions

Q1

*

$$m = \frac{8 - (2)}{4 - (1)} = 2$$

Divide change in y by change in x .

Q2

*

$$m = \frac{-1 - (5)}{4 - (-2)} = -1$$

Divide change in y by change in x .

Q3

*

$$m = \frac{-1 - (-3)}{6 - (2)} = 0.5$$

Divide change in y by change in x .

Q4

*

$$y = -3x + 4$$

Write in $y = mx + c$ order.

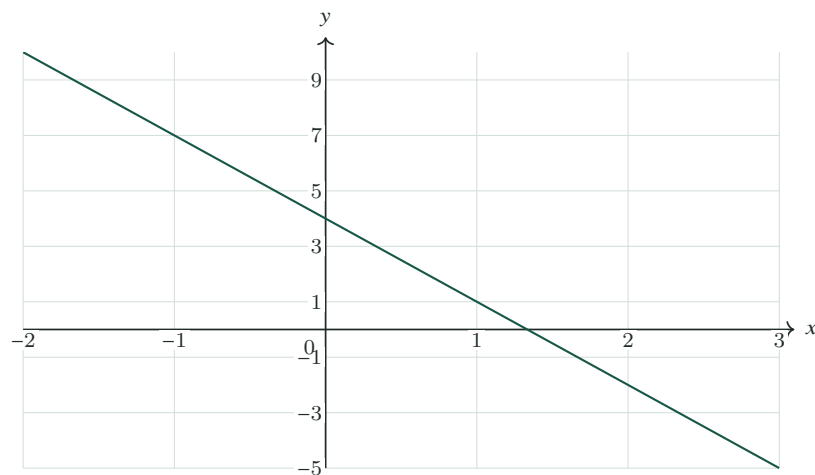
$$m = -3$$

Read the coefficient and constant.

$$c = 4$$

Sketch shown below

Plot the key points and join with the appropriate shape.



Q5

**

(a) $y = 0 \Rightarrow x = 4$

Set y to zero for the x -intercept.

(b) $x = 0 \Rightarrow y = 6$

Set x to zero for the y -intercept.

Q6

**

change in $x = 3 - 3 = 0$

The line is vertical.

$$x = 3$$

Every point on it has x -coordinate 3.

Q7

**

$$11 = 3(2) + c$$

Substitute the given point into $y = mx + c$.

$$c = 5$$

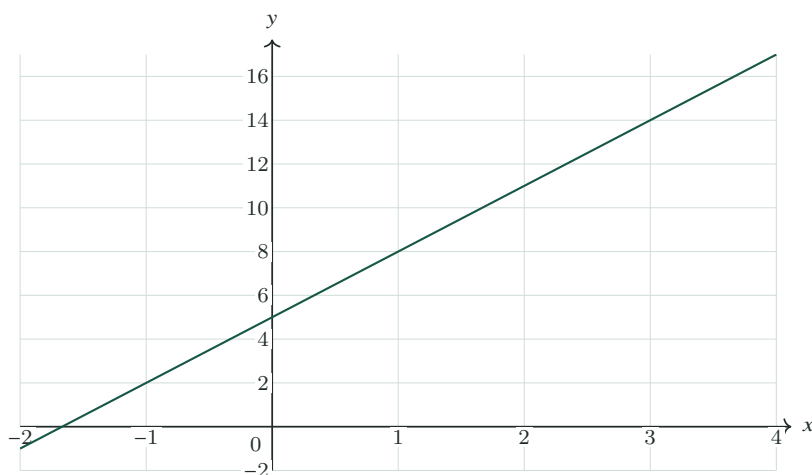
Solve for the intercept.

$$y = 3x + 5$$

Write the line equation.

Sketch shown below

Plot the key points and join with the appropriate shape.



Q8

**

$$-5 = -2(4) + c$$

$$c = 3$$

$$y = -2x + 3$$

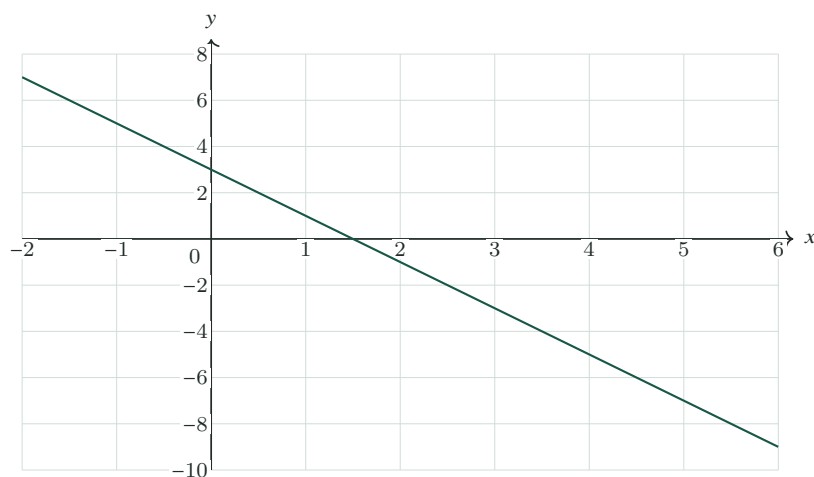
Sketch shown below

Substitute the given point into $y = mx + c$.

Solve for the intercept.

Write the line equation.

Plot the key points and join with the appropriate shape.



Q9

**

$$1 = 0.5(6) + c$$

$$c = -2$$

$$y = 0.5x - 2$$

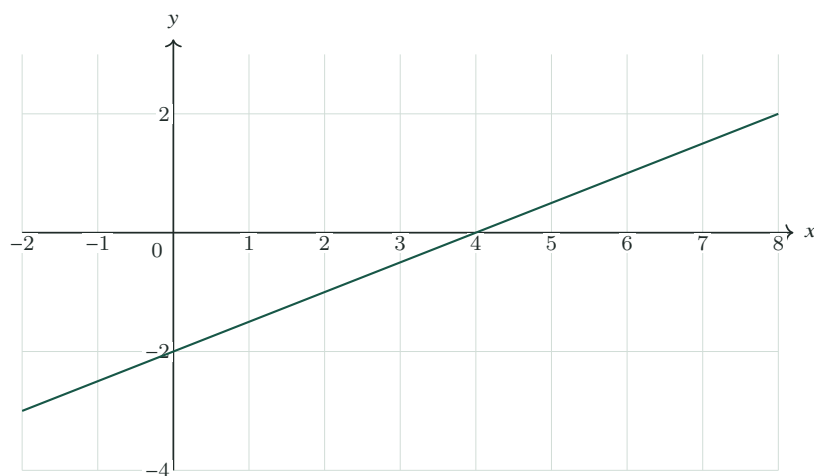
Sketch shown below

Substitute the given point into $y = mx + c$.

Solve for the intercept.

Write the line equation.

Plot the key points and join with the appropriate shape.



Q10

**

$$m = \frac{14 - 5}{4 - 1} = 3$$

$$5 = 3(1) + c \Rightarrow c = 2$$

$$y = 3x + 2$$

Calculate the gradient.

Substitute one point.

Write the equation.

Q11

**

$$m = \frac{0 - 4}{6 - 0} = -\frac{2}{3}$$

$$y = -\frac{2}{3}x + 4$$

Use the intercept points (6, 0) and (0, 4).

The y-intercept is already known.

Q12

$$m = \frac{1 - 7}{2 - (-1)} = -2$$

$$k = 1 + (-2)(5 - 2) = -5$$

Find the gradient from A to B.

Move three units right from B.

Q13

**

$$m = 4$$

$$3 = 4(2) + c \Rightarrow c = -5$$

$$y = 4x - 5$$

Parallel lines share the gradient.

Use the point.

State the equation.

Sketch shown below

Plot the key points and join with the appropriate shape.



Q14

**

$$m \left(\frac{2}{3} \right) = -1$$

$$m = -\frac{3}{2}$$

Perpendicular gradients multiply to -1 .

Take the negative reciprocal.

Q15

$$m = \frac{1}{2}$$

$$1 = \frac{1}{2}(4) + c \Rightarrow c = -1$$

$$y = \frac{1}{2}x - 1$$

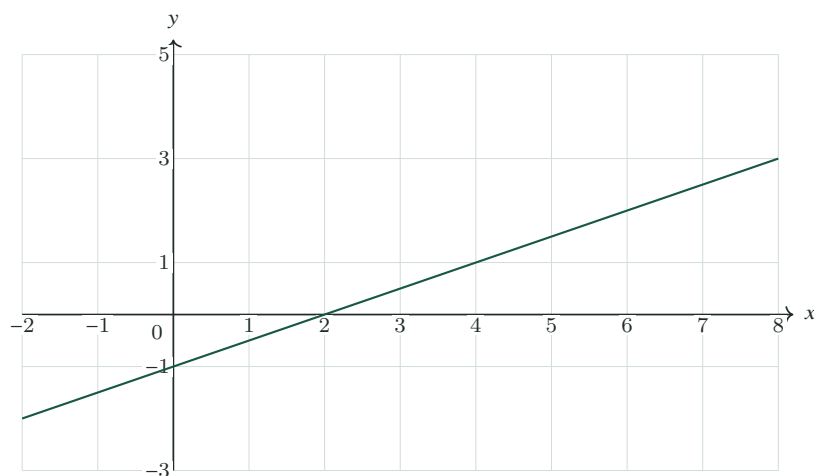
Negative reciprocal of -2 .

Use the point.

State the equation.

Sketch shown below

Plot the key points and join with the appropriate shape.



Q16

$$M = (2, 4)$$

$$m_{AB} = 1$$

$$m_{\perp} = -1$$

$$4 = -2 + c \Rightarrow y = -x + 6$$

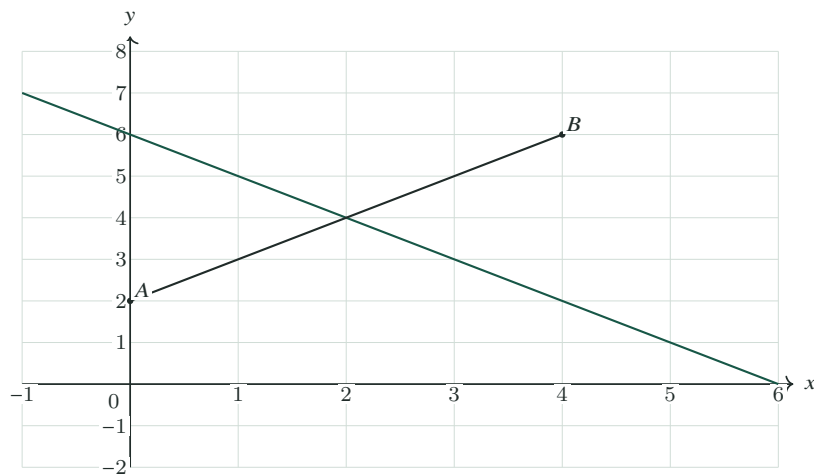
Sketch shown below

Find midpoint and segment gradient.

Take the negative reciprocal.

Use the midpoint.

Plot the key points and join with the appropriate shape.



Q17

$$m_1 = \frac{3}{2}$$

$$m_2 = \frac{2}{k}$$

$$\frac{3}{2} \cdot \frac{2}{k} = -1 \Rightarrow k = -3$$

Put each line in gradient form.

Use the product of perpendicular gradients.

Q18

$x = 5$ is vertical

$y = 7$

Identify its direction.

The required line is horizontal through the given point.

Q19

**

$$2x + 1 = -x + 7 \Rightarrow 3x = 6$$

$$x = 2$$

$$y = 5$$

Equate the two y expressions.

Find the matching coordinate.

Q20

$$y = 0 \Rightarrow x = 4$$

$$x = 0 \Rightarrow y = 8$$

$$A = \frac{1}{2}(4)(8) = 16$$

Find both intercepts.

The axes form a right angle.

Q21

$$x + 2 = 3x - 2 \Rightarrow x = 2$$

$$P = (2, 4)$$

$$OP = \sqrt{2^2 + 4^2} = 2\sqrt{5}$$

Find the intersection x -coordinate.

Substitute.

Use Pythagoras on the coordinate differences.

Q22

$$\frac{1}{2}b(6) = 9 \Rightarrow b = 3$$

$$0 = 3m + 6 \Rightarrow m = -2$$

Find the positive x -intercept.

Use the intercept in the line equation.

Q23

$$P = (0, t)$$

$$1 + (t - 1)^2 = 25 + (t - 3)^2$$

$$-2t + 2 = -6t + 34 \Rightarrow t = 8$$

Use that P lies on the y -axis.

Equate squared distances.

Expand, cancel squares and solve.

Q24

$$0 = -\frac{1}{2}x + 5 \Rightarrow x = 10$$

$$0 = 2(10) + c \Rightarrow c = -20$$

Their intersection lies on $y = 0$.

Use the same point on the other line.